



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
HAZARDOUS WASTE ENGINEERING RESEARCH LABORATORY
CINCINNATI, OHIO 45268

10/31/1985

DATE: October 31, 1985
SUBJECT: Chemical Processors, Inc., Seattle, WA
FROM: Ronald J. Turner *RJA*
Chemical Engineer
TTS, TDB, ATD, HWERL
TO: Chuck Rice
RCRA Compliance Section
USEPA, Region 10 (533)

Chem Pro
Rice 91
WA 2917

FILE COPY

It is our policy to notify the EPA regional offices and State offices of impending sampling and analysis activities in their jurisdiction. The USEPA's Office of Research and Development (ORD) is developing background information on control technologies for emissions from hazardous waste treatment, storage, and disposal facilities for use in setting standards of performance under Section 3004 of RCRA, as amended by the Hazardous and Solid Waste Amendments of 1984.

Assessments of alternative treatment processes are required so that the regulatory office (OSW) can be certain that adequate treatment technologies exist for wastes that will be banned from land disposal.

Under this program, the ORD had its contractor, Metcalf and Eddy, Inc., conduct a preliminary site visit to Chemical Processors, Inc. on August 22, 1985. As a result of this visit, this facility was selected for testing. The sampling of waste treatment processes is scheduled to begin on November 18, 1985.

I have enclosed a copy of the site visit report and a document summarizing 29 of the treatment processes considered "established alternative technologies."

If you have any questions, please call me at FTS 684-7775.

Attachments

cc: R. A. Olexsey

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USEPA RCRA



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J-1074

10 Harvard Mill Square
Wakefield, Massachusetts

Mailing Address: PO. Box 4043
Woburn, MA 01888-4043

4 October 1985

**HAZARDOUS WASTE TREATMENT, STORAGE AND DISPOSAL FACILITY
SITE EVALUATION REPORT**

FACILITY: Chemical Processors, Inc.

LOCATION: 5501 Airport Way
Seattle, Washington 98108

1701 Alexander Way
Tacoma, Washington 98421

Date of Visit: 22 August 1985

Persons Attending:	<u>Chemical Processors</u>	<u>Metcalf & Eddy</u>
	Ronald West (President)	Neville Chung
	Kelly Price (Plant Manager)	Mike Crawford

The United States Environmental Protection Agency Office of Research and Development (EPA-ORD) is developing information on the applicability, effectiveness, capacity, cost and environmental impact of existing treatment technologies for several categories of hazardous wastes which are under consideration for a land disposal ban. As part of this study, a number of commercial hazardous waste treatment, storage and disposal (TSD) facilities have been contacted,

and selected components of these TSD facilities have been identified for site evaluation visits. The purpose of the site evaluation visits is to obtain information on the wastes treated, the unit operations employed, the capabilities and limitations of the plants and the applicability of sampling the plants to document treatment capabilities. On August 22nd, Mike Crawford and Neville Chung travelled to Seattle and met with Ron West, the president of Chemical Processors, Inc. (Chempro). The following report summarizes the discussions and observations from the site visit.

HISTORY and COMPANY ORGANIZATION

Chempro was formed in 1970 by Ron West and two other partners. The objective in forming Chempro was to establish an outlet for the treatment, recycle and disposal of hazardous and industrial wastes in the Seattle area. Currently, Chempro owns or has a vested interest in four hazardous waste TSD facilities in the State of Washington.

The Lucile plant was the first facility that Chempro purchased. This operation was formerly owned by Preservative Paint who constructed the facility in the early 1950's for the recycling of solvents. Chempro bought the solvents and resins division of Preservative Paint in 1970, which in essence was an oil and solvent process design plant consisting of several distillation units.

Chempro executed an agreement with the City of Seattle to lease a 250,000 barrel tank farm in the Port of Seattle in 1971. This facility, referred to as Pier 91, was owned by Texaco in the 1920's,

transferred ownership to the Navy during World War II, and was operated by the City of Seattle prior to being leased, and subsequently purchased by Chempro. The operations at the Pier 91 facility revolve around the treatment and recovery of barge waste oils and the blending of this material with bunker fuel.

In 1972, Chempro developed a transportation subsidiary (Resource Recovery) to serve the Lucile plant, the Pier 91 facility and a landfill operation that Chempro owns in eastern Washington. The landfill is still operating, however, no industrial wastes are transported to this location.

Chempro constructed an industrial wastewater treatment plant on 16 acres in the port of Tacoma during 1975. The impetus for this endeavor was Chempro's assessment that there was a market demand for acid and metal treatment as a result of the numerous plating and miscellaneous support facilities in the Seattle area that contract with the Boeing Corporation. A major milestone in the growth of Chempro was the successful negotiation of a contract with Boeing in late 1975 to accept their hazardous wastes. Chempro has successfully renegotiated the contract with Boeing on several occasions, and are currently about 1.5 years into a 4 year contract. The majority of the waste generated by Boeing is treated at Chempro's Tacoma facility.

The last facility affiliated with Chempro is the McCleary Columbia plant in southern Washington. This facility was purchased in June 1985 and provides solvent recycling for the states of Washington and Oregon.

From 1976 to 1985, Chempro has focused on upgrading and retrofitting the Lucile, Pier 91, and Tacoma facilities to align with market demands, conform with city, state and federal regulations, and incorporate the use of developing technologies. All three of the above criteria are in a constant flux, and this is reflected in Chempro's long-term plan to continue to upgrade and expand their facilities with appropriate technologies. Modifications in progress include the implementation of sludge dewatering equipment at the Pier 91 and Tacoma facilities and storage tank relocation, refurbishing and expansion at the Tacoma plant. On the drawing board are modifications at the McCleary Columbia plant, and in the conceptual stage are a rotary kiln incinerator and thin-film evaporator at the Tacoma and McCleary Columbia facilities, respectively.

Chempro's corporate philosophy stresses the need for implementation of technically sound, environmentally acceptable practices that serve the community needs on a regional basis. Chempro operates a lab packing operation at it's Lucile plant, and they accept wastes from homeowners free of charge. They appear genuinely committed to serving the region and maintaining good community relations.

FACILITIES

Chempro's facilities include the corporate headquarters building in the Georgetown section of Seattle, the Lucile plant adjacent to the corporate headquarters, the Pier 91 facility on Puget Sound, the

Tacoma facility in the Port of Tacoma, the McCleary Columbia plant in southern Washington, the transportation subsidiary of Chempro (Resource Recovery), and a land disposal facility in eastern Washington. The treatment plants are all regulated under interim RCRA status. None of these plants have surface impoundments. The transportation subsidiary and the land disposal facility (which does not accept any hazardous waste) are of little interest in regards to the subject EPA study. A brief description of the other facilities is presented below.

Chempro Corporate Headquarters Building

The company's headquarters are located in the Georgetown district of Seattle, adjacent to Chempro's Lucile plant (also referred to as the Georgetown plant). The building is a refurbished, two-story railroad depot structure. The first floor accommodates the support staff, which processes the waste manifest forms, etc., and the office space for company management. The second floor consists of office space for the marketing and engineering divisions, and houses a fairly extensive analytical laboratory. Laboratory equipment includes a gas chromatograph with a flame ionization detector, an atomic absorption spectrophotometer, and a wet chemistry lab. Chempro plans to purchase an electron capture detector in the near future.

Lucile (Georgetown) Facility

The Lucile facility is the hub of Chempro's operations.
Normally the plant operates two eight-hour shifts per day, five days

per week. All drummed waste accepted by Chempro is tested, segregated and stored at the Lucile plant and subsequently either treated onsite or transported to one of Chempro's other facilities for treatment. Chempro is permitted to store 4,000 barrels at the Lucile plant. Accepted wastes are segregated into cells for acids, caustics, chlorinated organics, nonchlorinated organics, flammable wastes, cyanides, poisons, metal-bearing wastes and waste to be contained in lab packs.

Wastes are accepted in the south storage yard. Bulk acid, caustic and cyanide tank storage are provided above-ground in the south yard. Drummed chlorinated organic and flammable wastes are stored in the north storage yard. All other wastes are stored in drums and segregated into respective cells within a sheet metal storage building. Chempro is considering the installation of several additional above-ground storage tanks. Management is still weighing the environmental benefits of locating the storage tanks above-ground against the liabilities related to the respective fire protection. Currently all raw or untreated wastes are stored in above-ground tanks and finished products are stored in below-ground tanks.

The Lucile plant is operating under a consent decree because the facility does not meet the EPA interim final rule which stipulates a 50-foot setback from the adjacent properties. All reactive wastes are stored more than 50 feet from adjoining property lines.

Groundwater quality is monitored by an extensive network of monitoring wells. Initial monitoring results indicated groundwater

contamination by a number of chlorinated and nonchlorinated solvents with a total volatile organic concentration in the range of 100 ppm. Chempro continuously pumps the contaminated well water to the plant's cooling towers. The organics are stripped from the water, and the treated cooling water is discharged to the METRO West Point sewerage system. As a result of this continual operation, the total volatile organic concentration has been reduced from the 100 ppm range to the low ppm to high ppb range. The treated effluent from this interim air-stripping operation and runoff from the plant's grounds are the only wastes discharged to the West Point treatment plant. The effluent is monitored for total organic halide (TOX), metals, phenols, pH and several other parameters.

The Lucile plant is also currently operating under a variance from the Seattle fire department. Chempro is attempting to comply with the specific regulations. The plant has a sophisticated centrally monitored ultraviolet detection system for fire protection. The plant is also equipped with foam stations and the tanks are covered by a deluge system.

The principal unit operations of the Lucile plant are container handling and waste consolidations, solvent reclamation and distillation, cyanide treatment, and solidification.

Container handling operations include the segregation and condensing of incoming wastes, and the lab packing procedures. As previously mentioned, Chempro segregates the incoming waste such as acids, bases, chlorinated organics, nonchlorinated organics,

flammable wastes, poisons, metal-bearing wastes and wastes to be contained in lab packs. Wastes are received in bulk tank trucks, drums, and tub skids. For the most part, wastes are pumped by portable air pumps. Several air pumps are designated for specific wastes, e.g., the cyanide waste. All storage buildings and receiving yards are diked. Operations appeared orderly and clean. Respirators, cyanide antidote kits and eye washes were observed during the tour.

The distillation operation is a simple batch process for the recovery of solvents and also for the boil-down of solvents from sludges that are to be disposed in a landfill in Arlington, Oregon. Some solvent drying with potassium carbonate and calcium chloride is performed. The basic operation involves pumping the solvent waste to one of five 5,000-gallon storage tanks where limited solids separation occurs. The supernatant is pumped to the distillation pot which is rated at about 2,000 gallons per eight-hour shift. The distillation unit, which was first placed on-line in 1959, is an OSCO shell and tube unit. The operation is a semi-continuous process, with 100 to 200 gallons in the "still" at any given time. The vapor from the pot rises overhead to a condensor, then to the finish product tank. The reclaimed solvents are either returned back to the general industry (typically as a lacquer thinner) or transported to the Sistek cement kiln in California for use as a fuel. Sistek limits the chlorine content of the waste to 3 percent. Therefore, Chempro often blends the waste to obtain the desired chlorine

content. Figure 1 shows a flow schematic of the distillation process.

The cyanide treatment process is capable of treating a cyanide waste with an influent concentration as high as 100,000 ppm. For concentrated cyanide wastes (concentration in excess of 5,000 ppm), a proprietary electrolytic process is incorporated. This unit was placed on-line in 1976. The unit consists of two separate cells which are operated independently. Each cell has about an 800-gallon capacity with eight plates per cell. The reaction time required to treat a cyanide waste varies with the specific waste. Plant personnel estimate that for a 500-gallon batch with a cyanide concentration of 40,000 ppm, the retention time would be three to five days to reduce the cyanide concentration to between 500 and 5,000 ppm. The effluent from the batch electrolytic process is pumped to a reinforced fiberglass reactor vessel for further cyanide destruction by means of a conventional alkaline chlorination process. The chlorination process entails oxidizing the cyanide waste with sodium hypochlorite at an elevated pH. The effluent from this operation is either transported to the Chempro Tacoma facility if there is a high metals concentration, or to the Arlington, Oregon disposal facility for treatment via solar evaporation. The reactor vessel and electrolytic cells are housed in an area of the plant which is bermed to accommodate 100 percent of the tank volumes. The area is covered by a roof, equipped with an overhead ventilation unit and is monitored for hydrogen content by a hydrogen detector. Plant personnel indicated that their only observations are the presence of

ammonia at low concentrations. Figure 2 shows a schematic of the cyanide treatment operation.

Some still bottoms from the distillation process and sludge slurries that are received by Chempro are solidified at the Lucile plant. The wastes are solidified with diatomaceous earth and the solidified waste is transported to the Arlington, Oregon facility for ultimate disposal.

Pier 91 Facility

The Pier 91 facility is a 250,000-barrel tank farm. Unit operations at this facility include gravity separation, pH adjustment, chemical treatment, sludge dewatering, and fuel blending. The operations at this facility predominately pivot around waste oil recovery. Currently about 70 percent of the tankage at Pier 91 is dedicated for the storage of diesel and bunker fuel. The facility handles about 12 million gallons of bunker fuel per month. The remaining 30 percent is used for waste management.

The waste oil is typically separated by gravity separation, and the recovered oil is blended with the bunker fuel. The waste oil to bunker fuel blend is mixed at about 5 percent waste oil. The waste oil is actually beneficial in that its specific gravity is less than one and it has a low viscosity. A limiting criteria on the quantity of recovered waste oil that can be recycled is often the metals content, particularly the lead content of the waste oil.

In addition to gravity sedimentation, unit processes such as pH adjustment and chrome reduction by sulfite treatment are performed directly in the holding tanks when necessary. Over the past three to four years there has been an accumulation of sludge which Chempro has not attempted to remove. The facility does not generate a large quantity of sludge, but Chempro has realized the need for the removal of this material. Chempro has purchased, and is currently installing a two-phase bowl centrifuge to dewater the accumulated sludge. These sludges are not reactive.

In addition to chromium reduction by sulfite treatment, Chempro has treated washwaters from aircraft stripping operations. These wastes are high in phenol (about 1,000 to 2,000 ppm). Chempro will typically oxidize such a waste with hydrogen peroxide or permanganate.

The Pier 91 facility discharges about 0.5 million gallons per month of treated effluent and runoff to the METRO sewerage system. The criteria of most concern to Chempro is the 100 ppm limitation for metals. The Pier 91 facility may eventually be equipped to handle barge cleaning operations.

Tacoma Facility

The Tacoma facility was acquired by Chempro in 1975. The original plant consisted of a small waste oil recovery operation on 16 acres in the Port of Tacoma industrial park. Since that time, Chempro has abandoned the original oil recovery plant and installed 26 chemical storage, waste storage and reactor vessels. The average

discharge from this facility to the Tacoma sewerage system is about 250,000 gallons per month.

The plant incorporates three steps in the treatment process. First, if the waste is concentrated, Chempro will dilute the waste with recycled treated effluent. Second, for chromium wastes, the chromium is reduced to the trivalent state with bisulfite, then precipitated with lime. Lime is obtained from a baghouse operation across the street from the Chempro Tacoma facility. Third, metal wastes are precipitated with lime and settled by gravity sedimentation. The decant from these operations is pumped to a discharge tank and subsequently to the Tacoma sewerage system. The sludge slurry is currently hauled to Arlington, Oregon and dried by solar evaporation. Chempro has ordered a cycling press for this facility. Installation is expected prior to November 1st. For hydroxide sludges Chempro anticipates a 35 to 40 percent solids cake.

The Tacoma facility receives waste from a waterfall spray paint booth operation about once a month. This waste is pH adjusted, subjected to gravity separation and the sludge is transported to Arlington, Oregon. On a number of occasions Chempro has received some chelated or sulfide waste that they cannot adequately treat. In these circumstances the wastes are transported to Arlington for solar evaporation. Figure 3 presents the treatment process flow chart for the Tacoma plant.

Chempro is now negotiating for additional acreage adjacent to the Tacoma facility. Chempro is contemplating the installation of

various unit operations at this location. Thermal/mechanical evaporation is being considered by Chempro for two reasons: first, Chempro is beginning to approach permit limits for metals discharge; and second, thermal/mechanical evaporation processes are capable of treating chelating materials. Also, Chempro is evaluating the feasibility of installing a rotary kiln incinerator at the Tacoma facility. Combustion Engineering has recommended a 30 million Btu rotary kiln incinerator.

McCleary Columbia Facility

This plant is the most recent Chempro acquisition. Geographically, the plant is located in southern Washington and serves both Oregon (predominately the Portland area) and Washington. The plant consists of several distillation units and primarily functions as a solvent toll recycling facility. Management indicated that they plan to upgrade this facility appreciably, and are evaluating the feasibility of installing a thin-film evaporator at this location. Because of the recent acquisition of the plant (June 1985), Chempro's lack of in-depth familiarity with the facility, the limited diversification of unit operations on-line, and the distance from the facility to Seattle, this plant was not toured as part of the site evaluation visit.

WASTES ACCEPTED

Chempro accepts and treats a variety of different hazardous wastes. Regardless of the waste, the receiving process for each shipment is the same. The first step is to conduct a waste profile. Chempro supplies the generator with a characterization form to obtain as much information on the waste as possible. This information is reviewed by Chempro's regulatory affairs personnel and a determination is made whether Chempro should proceed further. If the waste contains hazardous material which Chempro cannot handle based on their permit, the process goes no further. Otherwise, Chempro will next request a representative sample to characterize analytically and evaluate the treatability of the waste. If the waste is treatable and within the treatment realm that Chempro has to offer, the waste is scheduled for shipment and subsequent treatment. If the waste is not treatable by Chempro, they often will line-up another facility (such as the Kettleman Hills facility in California) to handle the waste.

The Lucile plant is the major receiving area for most wastes, although some bulk shipments may be transported directly to the Tacoma facility. Solvents accepted may be halogenated or nonhalogenated. Because the solvent waste finished products are often recycled, an important barometer for incoming wastes is whether they are post-industrial with a high metals or other contaminant content. Also, because solvents and other waste with a high Btu content are often transported to the Sisteck cement kiln, it is

important that the suspended solids of the waste can be reduced to a relatively low level. The Lucile plant also receives waste with a cyanide concentration as high as 100,000 ppm.

The Pier 91 facility predominately receives large volumes of wastewater from ship repairing and tanker cleaning operations. Waste oil is the major constituent. On occasion this facility has accepted boric acid (from Ventron), some metal finishing waste (particularly from an aluminum can manufacturer), and limited washwaters from the stripping of aircrafts (high in phenol content). Due to fire protection regulations, this facility does not accept combustible materials other than tanker related waste.

The Tacoma facility primarily accepts acids, caustics, high metal content wastes, and low metal content wastes. A large volume of these wastes is generated as a result of the tight specifications implemented in the aerospace industry. These wastes consist largely of spent acids and plating baths. This plant also receives the spent waste from a waterfall spray paint booth operation, and a number of chelated wastes and sulfide wastes.

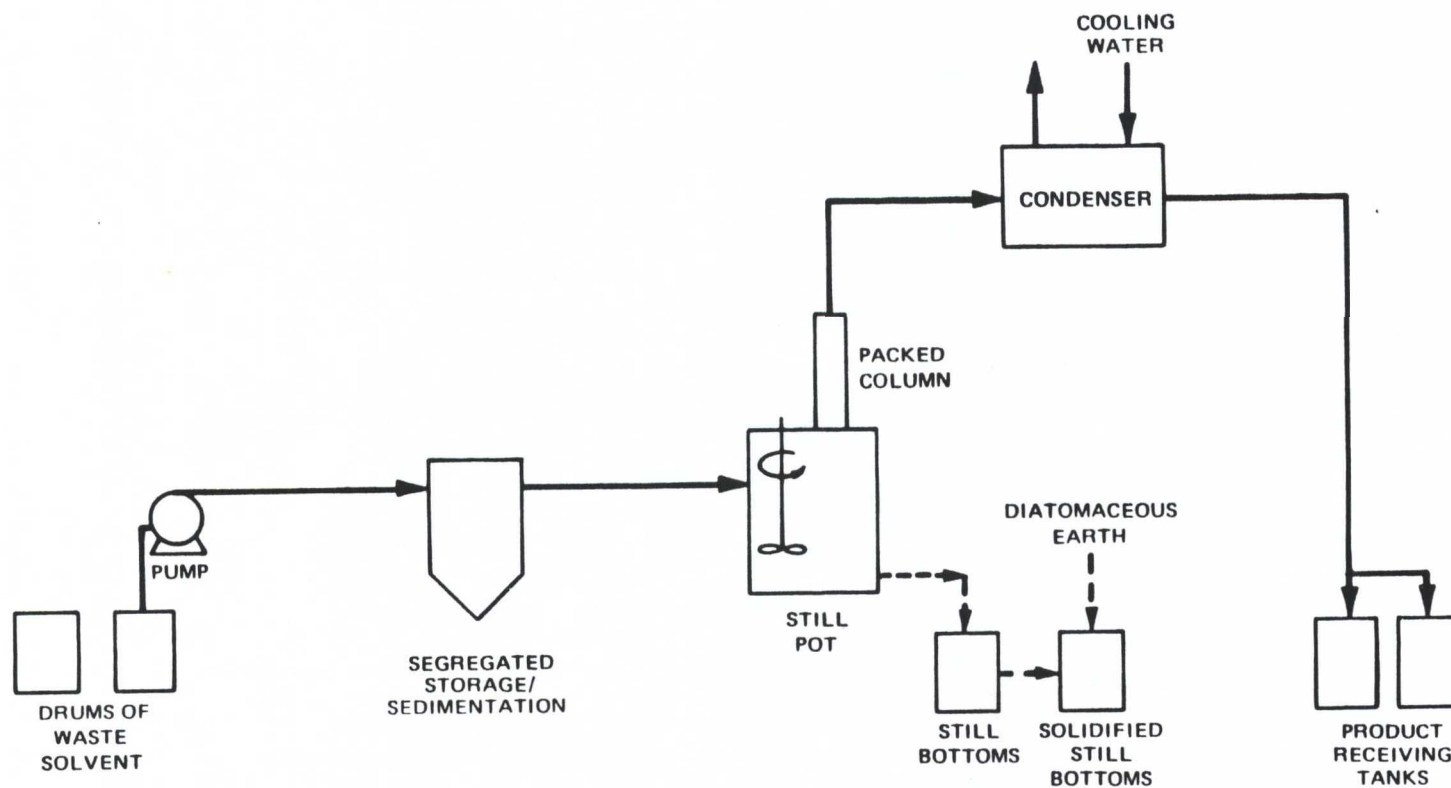


FIGURE 1. DISTILLATION PROCESS – CHEMICAL PROCESSORS, INC.

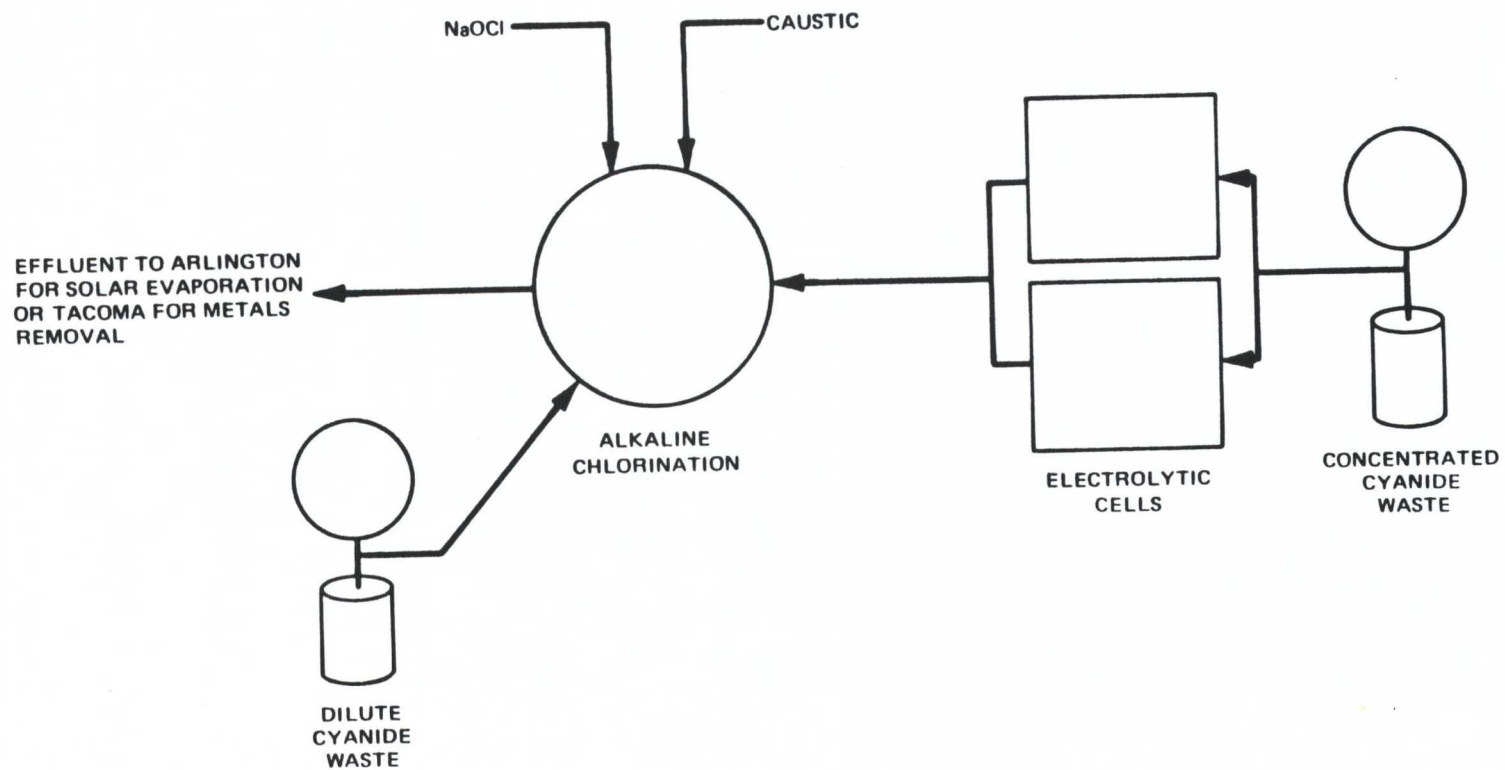


FIGURE 2. CYANIDE TREATMENT SCHEMATIC – CHEMICAL PROCESSORS, INC.

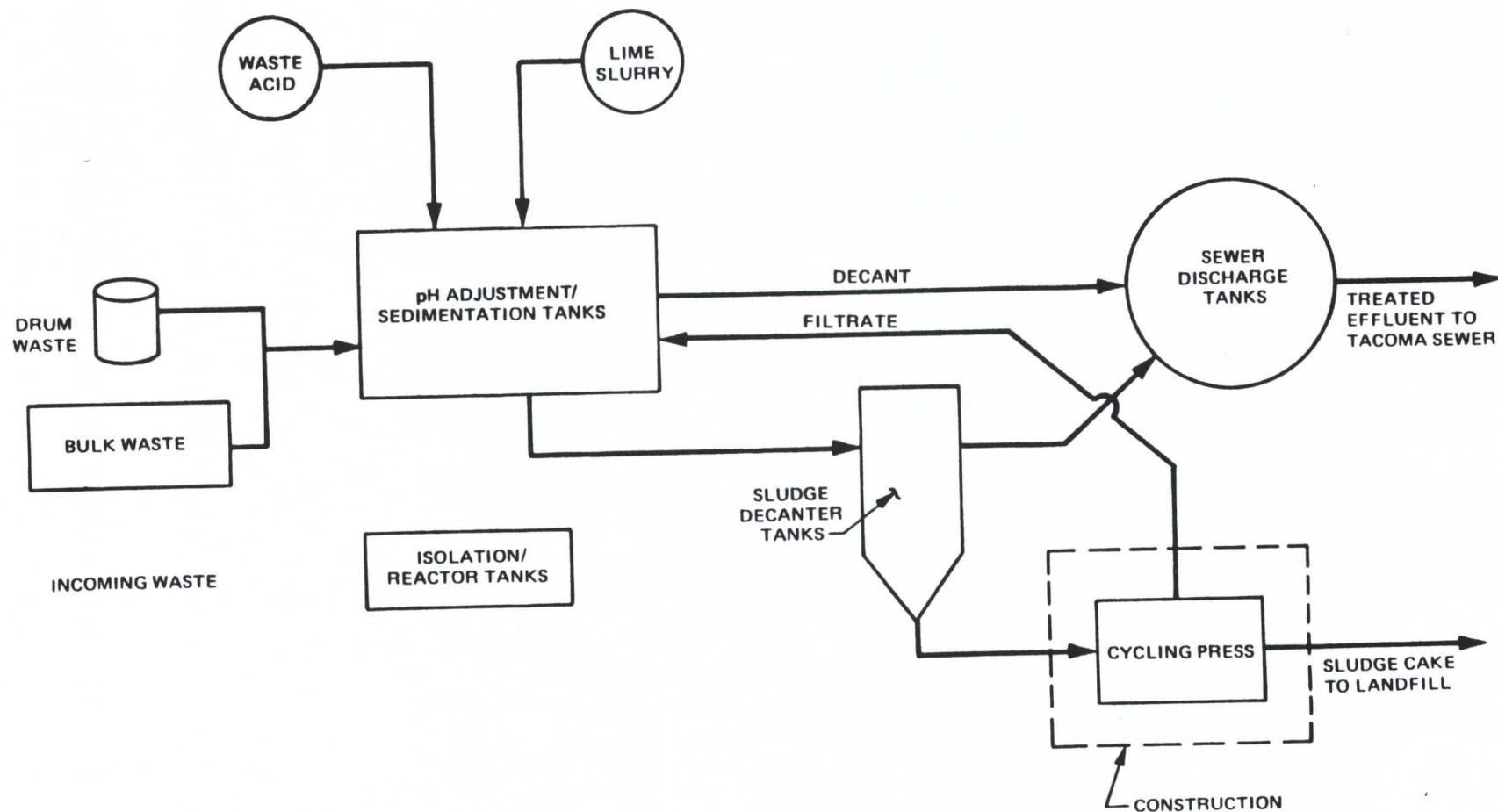


FIGURE 3. AQUEOUS WASTE TREATMENT FACILITY – CHEMICAL PROCESSORS, INC.
(TACOMA FACILITY)